

REMARKS

Please enter the above noted changes to the above-identified application before conducting an examination thereof. The Applicants submit that no new matter has been added by such amendments.

The Specification has been amended to correct minor typographical and grammatical errors presented therein and to make the Specification conform to the original filed figures. The drawings have been corrected to coincide with the original filed Specification and to accurately depict the elements identified by and referred to therein.

In conjunction with the instant application, the Applicants have filed a Petition to Make Special based on a search being performed. The Petition, corresponding documentation and authorization to charge Deposit Account [have been submitted to the Group Director, per MPEP §708.02, under separate cover] are also being submitted herewith.

Change of Correspondence Address

Please address all future correspondence relating to the instant application as follows:

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A separate, formal change of correspondence address is also being submitted with this amendment as Exhibit D.

The Commissioner is hereby authorized to charge any underpayment or credit any overpayment to Deposit Account No. 50-0441 for any payment in connection with this communication, including any fees for extension of time, which may be required. The Examiner is invited to call the undersigned if such action might expedite the prosecution of this application.

Respectfully submitted,


By: 

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Date: February 13, 2002

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please replace paragraph beginning on page 4, line 17 with the following:

FIG. 4 illustrates the partially completed multi-die module of FIG. 3, after unpackaged semiconductor die 110 has been encapsulated with encapsulation material 180. Some examples of encapsulation material 180 are epoxy, metal cap or silicon coatings. Encapsulation material 180 may be dry molded or liquid molded depending on the type of encapsulation material desired. At this stage, solder balls 160 may be added to the bottom of multi-die module substrate 140 to provide for future connection of the completed package module 100 (FIG. 1) to a circuit board and/or other system. In order to facilitate interchangeability with many standard packages, solder balls 160 may have a pitch of 1.27 millimeters, 1.0 millimeters, 0.80 millimeters, 0.75 millimeters, or any other pitch suitable for a desired application. It will be appreciated that solder balls may be added at other suitable times during the manufacturing process.

Please replace the paragraph beginning on page 5, line 10 with the following:

FIG. 6 illustrates a heat sink 150 added on top of unpackaged semiconductor die 110 and packaged die 120 and 130 to aid in removing heat from the circuits. As illustrated, the distance "d" from the top of multi-die module substrate 140 to the top of packaged die 120 and 130 is substantially equal to the distance from the top of multi-die module substrate 140 to the top of the encapsulation material over unpackaged semiconductor die 110, which is referred to herein as the top of unpackaged semiconductor die 110. IN at least one embodiment, distance "d" is about 1.3 millimeters. Making these distances the same facilitates effective use of heat sink 150, although heat sink 150 could be fabricated to account for any difference between the heights of various packaged and/or unpackaged die attached or mounted to multi-die module substrate 140. IN various embodiments, heat sink 150 may be a thin strip of heat conductive material, a large heat sink with fins for added heat dissipation, or any other suitable type of heat sink.

Please replace the paragraph beginning on page 6, line 7 with the following:

FIG. 9 shows packaged die 120 and 130 attached as already discussed. Note however, that the top of unpackaged semiconductor die 111 is not level with the tops of packaged die 120 and 130. Therefore, shim 190 is used to effectively raise the top of unpackaged [chip] die 111 to be even with the tops of packaged die 120 and 130, and thereby facilitate the use of a heat sink (not shown). Shim 190 may be composed of silicon, or another suitable heat conveying material.

It will be appreciated that a shim such as shim 190 may be used on top of packaged die 120 and/or 130, instead of or in addition being used on top of unpackaged [chip] die 111 if needed.

6. (Amended) The device as in Claim 1, wherein [directly attached includes] the unpackaged semiconductor die is wire bonded to the package module.
7. (Amended) The device as in Claim 1, wherein [directly attached includes] the unpackaged semiconductor die is attached to the package module by flip-chip attachment.
9. (Amended) The device as in Claim 1, wherein the unpackaged semiconductor die is encapsulated onto the package module.